COMPARISON OF DIFFERENT VERSIONS OF AHP
IN ASSESSING CRITERIA WEIGHTS

Mari Pöyhönen and Raimo P. Hämäläinen
Systems Analysis Laboratory
Helsinki University of Technology
Otakaari 1 M, 02150 Espoo, FINLAND
mari.poyhonen@hut.fi / raimo@hut.fi

Abstract: The existing literature on multicriteria decision making has shown that the weighting methods based on estimates of weight ratios yield diverging results. The differences between the AHP and other weighting methods were studied during spring 1996 in an international experiment run through the Internet. The AHP weights were elicited with different versions where the evaluation scales and the formulation of the questions were varied. The used scales are the traditional nine point integer scale and the new balanced scale proposed by Salo and Hämäläinen [3]. In the pairwise comparison there were two ways to ask the questions: the ranges of outcomes of attributes were either explicitly introduced or were not presented at all. In addition to the new versions of the AHP, the new features of this experiment are that the subjects were able to modify the test task individually so that the number of attributes varies. The subject were also able to interactively evaluate the results.

The methods based on estimates of weight ratios yield mainly similar weights. The differences in results are due to the used evaluation scales to give weight ratios. The number of attributes affects the variation in weights and the inconsistency between the preference statements [1, 2]. The variation in weights as well as the inconsistency between the statements increases as the number of attributes increases. The subjects are equally inconsistent between their statements with all the methods where they were asked redundant questions. Inconsistencies in the AHP statements and the variation of weights depend on the evaluation scale used. The balanced scale decreases the inconsistency of the comparison matrices and the variation in weights compared to the nine point integer scale.

[1] Pöyhönen, M., Hämäläinen, R.P., and Salo, A.: "An Experiment on the Numerical Modeling of Verbal Ratio Statements," Journal of Multicriteria Decision Analysis, 5, 1996.

[2] Pöyhönen, M., Hämäläinen, R.P.: "Notes on the Weighting Biases in Value Trees," Research Report A63, Systems Analysis Laboratory, Helsinki University of Technology, April 1996.

[3] Salo A. and Hämäläinen, R.P.: "On the Measurement of Preferences in the Analytic Hierarchy Process," Research Report A47, Systems Analysis Laboratory, Helsinki University of Technology, March 1993.